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Alaska's farm & consumer report

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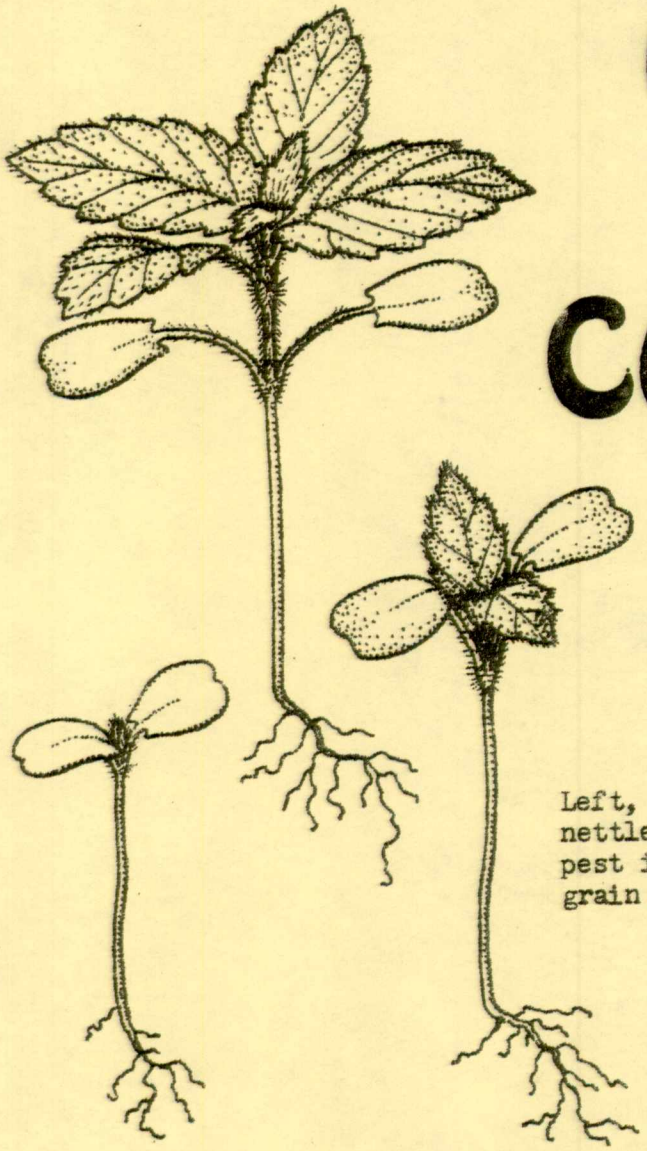
1964
RESEARCH
PROGRESS

ALASKA'S FARM & CONSUMER REPORT



Left, seedlings of hemp nettle, a serious weed pest in many of Alaska's grain fields

ALASKA AGRICULTURAL EXPERIMENT STATION — University of Alaska

COOPERATING WITH THE
UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF THE DIRECTOR
PALMER, ALASKA 99645

CONTENTS

Sketches by L. J. Klebesadel are from his Bulletin 34, Lawn Weeds. They suggest the current national concern over pesticide utilization -- a subject of interest to many Alaskans.

The Alaska Agricultural Experiment Station, an arm of the University of Alaska, was founded near the turn of the century when the federal government established a series of demonstration farms to define Alaska's food production potential. In the early 1930's the then existing facilities were transferred to the Alaska Agricultural College and School of Mines from which later emerged the present University organization. In the late 1940's the Congress directed the U. S. Department of Agriculture to join forces with the University in strengthening research which might accelerate Alaska's self-sufficiency with respect to food. This action was considered essential to the nation's defensive posture.

The Experiment Station's research program is still a joint endeavor, the director and many project leaders holding federally classified appointments. Integration and coordination is effected through a special agreement vesting program affairs in the director who resides within the state and serves the University as well as the Department. He reports to the Secretary of Agriculture through the Cooperative State Research Service and the Agricultural Research Service, and to the University through the Vice President for Research.

Because of its joint nature and the supplemental funding thereby made available, the on-going program is nearly a third larger than might otherwise be supported in Alaska. Since 1948 the federal-grant and state appropriation which traditionally support the land grant college farm research have been routinely supplemented by additional federal funds. In recent years some foundation grants have been awarded to the Station.

The Experiment Station is headquartered at Palmer in a federally owned facility which provides some 8,000 square feet of offices, laboratories and workrooms. In addition there is a 23-acre tract devoted to small plot work, greenhouses, modest growth chambers, cold storage, and a water supply adequate for field irrigation. State facilities include three farms -- one adjoining the University Campus, one at Matanuska, and a third devoted to fur studies at Petersburg. Somewhat over a third of all field studies are accomplished in cooperation with farmers, marketing organizations and consumers.

The professional staff of about 22 project leaders is organized into research teams attacking specific problems. Work plans are documented in terms of research projects which normally run for two years or more. They are usually revised at the end of five years if objectives have not then been attained. All project leaders are actively engaged in research. They define problems, devise specific approaches, supervise research activities, interpret and report results. Their professional growth is judged in terms of publication.

Three general kinds of research effort are carried on. Applied studies have already contributed new crops and improved practices to Alaska's farmers. Developmental research has assisted consumers, and both urban and rural residents. Basic research, underwritten chiefly with federal and foundation support, is yielding new knowledge about the subarctic that may someday underpin additional gains in resource use.

developmental problems

Since the expanded farm and consumer research program was first undertaken in 1948, Alaskans have brought many special problems to the staff. Several of these given attention during calendar 1964 are described below. This kind of activity was partially financed by Alaska's Cooperative Extension Service.

A farmer-owned corporation was organized in Fairbanks for the purpose of constructing and operating a small dairy processing plant. Assistance was asked in designing the building and plant. With the help of North Dakota's Dairy Division a plan was devised and furnished by the agricultural engineering staff. Additional assistance was also provided during construction. This plant started operating in mid-1964. It furnishes a firm market for locally produced milk and offers a new service (glass jugs) to Fairbanks consumers.

Farmers Home Administration borrowers in the Soldatna area encountered a unique "crawl space" moisture problem under basementless low-cost houses supported by only footings. Recommendations to cover exposed earth with 6-mil polyethylene were accepted and found to resolve condensation difficulties. In one case louvre ventilation was installed to provide adequate air movement. In another, forced ventilation was needed and installed according to recommendations provided by the station.

A pier-and-bond beam foundation was designed to support houses in the Valdez community, especially on those sites having an exceptionally high water table. This design will be useful in rebuilding the earthquake stricken town.

Plans for a 100-head per month farrow-to-finish swine building were completed. Undertaken at the request of the Homer rural area development group, these plans will possibly be utilized in establishing a hog enterprise in that area. Plans were basic to developing feasibility estimates on which financing depends.

Dairy husbandmen supplied technical assistance to dairy producers in the form of individual advice on record keeping, culling, yard layout, general management and other matters. Most dairymen were seeking greater economy and efficiency because of their failure to be awarded any portion of the military fresh milk market. Many have reached a fair degree of efficiency, to the degree permitted by limited physical facilities and stringent sanitary regulations. Few are able to produce greater volumes without additional capital outlays of large magnitude.

fertilizers

Just as in other food producing regions of the United States, Alaska's soils require commercial fertilizers to supply nitrogen, phosphorus and potash. Some areas also need lime and minor elements for certain crops.

New forms of fertilizer promise benefits in the form of cash-out-of-pocket savings to Alaska's farmers, providing they can be as efficiently utilized by plants as the traditional formulations. For example calcium metaphosphate was just as effective as treblesuperphosphate in supplying phosphate to Kennebec potatoes on Knik silt loam near Palmer, and to grass on the Kenai Peninsula. A new unnamed potato and table beets failed to respond as well to metaphosphate fertilizer. A calcium silicate compound tested in the greenhouse gave improved barley yields. Diammonium phosphate applied to a newly cleared field near Willow proved inferior to a mixture of ammonium nitrate and treblesuperphosphate in stimulating vegetables. Potatoes responded just as well to "Aqua-humus" -- a patented material -- as to regular fertilizers, but equal quantities of nutrients are cheaper in the non-patented form. Urea and ammonium nitrate were equally effective in producing potatoes and as a summer source of nitrogen for grass. A slowly soluble lawn fertilizer proved no better than ordinary mixes.

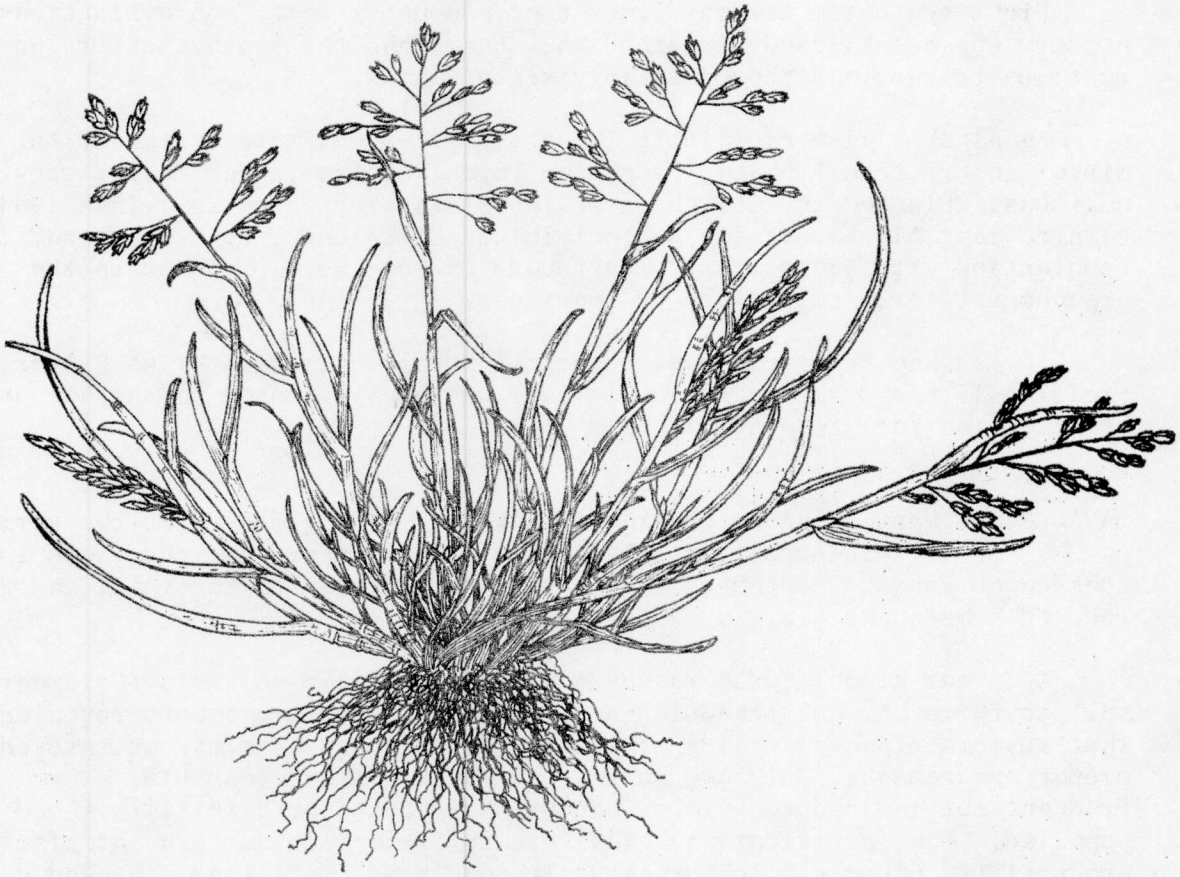
Marl from local deposits again proved slightly inferior to agricultural lime as a source of calcium for agricultural soils in the vicinity of Willow and on the Kenai Peninsula. Mechanical obstacles to the use of local marl are its wet cloddy condition, high labor requirements, and relatively low calcium content. These largely offset its apparent cheapness. Agricultural lime worked into the upper plow layer at the rate of one ton per acre seemed adequate for most vegetables and barley, althouth oats produced maximum yields when 2 tons per acre were applied. A liming rate of 2 tons/acre is recommended for those mineral soils requiring lime.

A widely publicized minor element spray reduced potato yields in a preliminary evaluation. On the other hand, a soil suspected of minor element deficiencies did not respond to a wide combination of treatments as judged from cauliflower responses.

Native bluejoint grass (Calamagrostis sp.) gave improved yields in response to nitrogen, phosphate and potash. A 1-4-1 formulation proved superior to a 1-2-1 ratio for both barley and oats growing on Matanuska Valley podzols, with row placement being more effective than broadcast application. Potassium applications markedly improved bromegrass growth on Knik silt loam. Potassium sprays on a potato field exhibiting acute k deficiency reduced tissue breakdown rates; those vines sprayed with potassium exhibited frost tolerance.

Analysis of potato foliage and tubers from response comparisons revealed that potassium applications fostered the uptake of potassium, calcium and magnesium of tubers, and of phosphorus by the foliage. The calcium/magnesium ratio of the foliage was increased by potash applications, that of the tubers reduced.

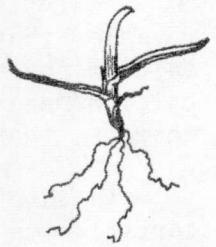
In an effort to promote timothy (which has many desirable characteristics) on the Kenai Peninsula a severe leaf spot problem was encountered. Heavier potash applications seemed to correct this difficulty. Each potash increment increased the phosphorus content of the harvested grass as well as its uptake of nitrogen and potash. With 160 pounds/acre of K_2O, all of the applied nitrogen (150 pounds) and half of the applied phosphate was recovered. With no K_2O, only half of the applied nitrogen and a quarter of the phosphate was recovered. Comparing time of application, the potassium content of timothy fertilized in the spring was greater than that fertilized in the fall; this indicates some potash loss from fall applications.



ANNUAL BLUEGRASS

forages

Effort to devise new lines and varieties exhibiting superior resistance to winter injury and lodging continue. Tillage practices, forage preservation and basic studies also received attention.



After several seasons commercial supplies of Alaska B-1 bromegrass, a superior strain developed by the Experiment Station, will become available in the spring of 1966. A commercial seed increase block of 20 acres has now been planted. In tests in 1963 at both Matanuska and Fairbanks, average yields of B-1 were higher than for seven other strains of northern brome including Manchar, Carleton and Canadian Commercial. A characteristic of B-1 is vigorous spring growth. B-1 continues to exhibit superior winter survival and lodging resistance.

Eight synthetic timothy lines continue under test. An evaluation nursery was established at Matanuska. Engmo and the synthetic strains continue to outyield the Canadian variety Climax.

An Alaskan line of alfalfa (M. sativa) A-3 was more resistant to winter injury than Rambler, Ladak and Vernal in the Tanana Valley comparisons. Planted in 1963 the new line shows great promise. In a 1964-planted test Alaska alfalfa A-2 outyielded M. falcata, both alone and in combination with bromegrass. Ten pounds of seed were produced in the greenhouse, force pollinated by honeybees.

An Alaskan selected sweetclover S-1 survived the winter at Palmer, yielding 15 pounds of seed. Red clover was again exposed to another cycle of selection for winterhardiness.

MANAGEMENT Harvesting pure stand alfalfa at College disclosed the period of mid-August most favorable to wintersurvival and yield in subsequent years. September 10 harvest induced severe winterkill and reduced subsequent yields.

A 3-year study of the response of native bluejoint grass (Calamagrostis sp.) to three harvest schedules and five fertilizer treatments revealed that sustained annual yields of 1 to 2 1/2 tons per acre may be insured by proper management. Only one harvest per season seems feasible. More frequent cutting reduced yields except where a complete fertilizer had been supplied. Low fertilization rates were sufficient to sustain satisfactory productivity under single harvests although more fertilizer improved quality as judged by crude nitrogen content.

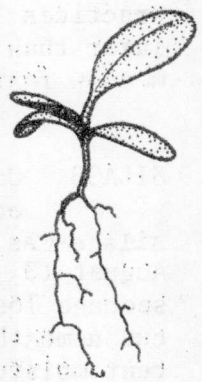
Planting date was found to control time of heading in a trial to define practices leading to maximum seed production. Bromegrass and timothy seeded later than mid-July produced few heads. A similar response was seen in meadow foxtail, bluegrass and red fescue.

SILAGE Oat-pea forages insiled at two different stages of maturity were equal in feeding value. Lower seepage losses and better quality silage was obtained from the more mature roughage. The mixture cut on August 13 (panicles emerging, peas in flower) contained 87 per cent moisture, seepage losses accounting for 15 per cent of the total. The same mixture cut a month later (oats in milk stage, peas podded) contained only 81 per cent moisture, 11 per cent of the total being lost through seepage. TDN for both silages was 64 per cent.

MINIMUM TILLAGE Many roughage plantings exhibit delayed germination after seeding because of inadequate seedbed moisture caused by excessive drying during tillage. A field evaluation in 1964 confirmed these observations. Oat-pea mixtures germinated quickly when planted immediately after tillage, although they failed to hold this advantage throughout the season. Delayed plantings failed to emerge uniformly even though 0.32 inches of rain fell in a period 6 to 9 days after planting. Heavy rains two weeks after stimulated complete germination of all plots.

dairying

Fresh milk production for Alaska's consumers offers one way of utilizing some of the state's land and contributing to the country's general economic development. Studies of problems unique to Alaska's dairy industry are supported by the Experiment Station.



Obtaining herd replacements is costly. Long term studies have shown that good replacement cows can be obtained from systematic crossbreeding and raised on the farm with less out-of-pocket cost than is required to import them. Lactation records obtained in 1964 again confirmed that crossbreeding is an effective herd improvement tool until production levels of, say, 12,000 pounds per cow per year have been obtained. Thereafter controlled crossbreeding is just as effective as pure line breeding in maintaining high production and in obtaining further improvement. Crossbreeding is especially effective in obtaining improved daughters from poor producing cows.

By the end of 1964, 16 Dane x Holstein crosses had completed 28 lactation records, averaging 13,818 pounds of milk (517 fat) annually as compared to their dams 13,351 pounds of milk (485 fat) average on 30 records. Other comparisons of the crosses with various groups such as purebred sisters also indicate a remarkable similarity between the Red Dane sires and the Holstein sires in their ability to pass on production capability to their daughters.

In the Guernsey segment of the experimental herd, continuous breeding with high volume Red Dane and Holstein sires has continued to raise production volumes. For example, eight records of four H-DHG four-way crosses averaged 12,329 pounds of milk (469 pounds fat) annually. Crossbreeding has proved extremely rapid and efficient in up-grading a herd of high testing, low volume cows.

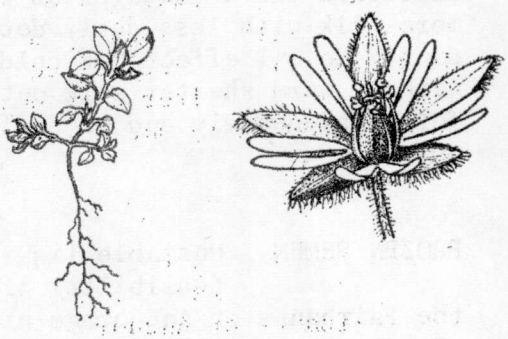
CALF RATIONS Meat-and-bonemeal as a source of protein for growing out dairy calves was compared with the customary plant proteins. The results indicate that good meat-bonemeal is a good substitute source of protein, and that it can replace some of the expensive plant protein usually incorporated into a calf ration. While palatability is reduced by excessive use of meat-bonemeal, liveweight gains were satisfactory. This evaluation is based on the production of 48 dairy calves provided a minimum of fresh milk.

LOOSE HOUSING A November-April comparison of 5 lactating cows without warm housing and 5 cows in a normal warm barn again disclosed the advantages of warm shelter. Those warmly housed produced more milk with less daily decline on less feed and utilizing less bedding. No ill effects of cold weather (lows to -42°) on the animals without warm shelter were detected. A hot water heated feed bunk performed adequately and no difficulty was experienced in feeding silage outdoors.

FROZEN SEMEN Unstable liquid nitrogen supplies still detracts from the feasibility of depending solely on frozen semen in either the Fairbanks or Anchorage milkshed. Temporary loss of refrigerant nitrogen would introduce economically intolerable delays into a breeding system. Frozen semen continues to be less efficient than two-day old fresh semen.

climate & light

An effort is underway to relate certain climate characteristics to crop responses in Alaska's well developed food producing regions. Using techniques developed elsewhere, prediction indicators for such characteristics of importance to farmers as "wet-day" and "dry-day" sequences are being developed.



An additional 1,009 card accessions enlarged the local library of meteorological data for areas in Alaska which possess agricultural significance. Included were partial records for 192 locations, most exceeding 10 years in length. Original data for Aniak, Allakaket, Chickaloon, Rampart, Strelna and Palmer was transferred to cards for machine manipulation.

A publication predicting probabilities of wet and dry days at four precipitation thresholds and for 10 Alaskan sites is being prepared by a regional committee of the north central states. A data extraction program for a 1620 IBM computer at the University of Alaska is being obtained from the South Dakota Experiment Station.

Environmental parameters now being defined at Palmer include, in addition to standard Weather Bureau measurements, total short wave and net radiation and soil temperatures from 1 inch below the surface to a depth of 10 feet. Net radiation is now being measured with a Funk instrument which is superior to others in that it functions during rain and snow; a new dual pen recorder accumulates both net and total short wave energy data on a single chart. Net radiation for the Tanana Valley will shortly become available through cooperation with the Weather Bureau.

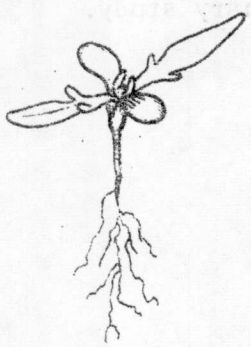
New land clearing at the College Farm provides an opportunity to observe the rate of permafrost recession and relate it to cropping practices. During the year a site was prepared and three temperature probes were installed, carrying thermocouples to various depths. Probes were also installed to permit measuring substrata moisture content by the neutron technique. During the summer of 1964 frost receded only 3 feet under the original forest cover, but went down below 14 feet where the forest was totally removed.

Three instruments of identical design were constructed by the Geophysics Institute for measuring light quality. They provide data on direct sunshine and total light intensity, both direct and diffused, throughout the day and, additionally, divide the spectrum into six arbitrary non-uniform bands. One instrument is operating at Matanuska (61° N), one at Columbia, Missouri (38° N), the third at Caracas, Venezuela (10°N). Purpose of the study (which is supported by the National

Institutes of Health) is to discover if differences in light quality at various latitudes may significantly influence plant responses. Records from the three stations will become available by mid-1965 for preliminary study.

grasses

A widespread renewable resource of subarctic regions is grass. Unique characteristics of northern grasses have justified rather intensive basic studies of certain species having possible economic significance.



A biosystemic study disclosed the presence of a decaploid chromosomal race and some aneuploids in the complex octoploid B. pumpellianus taxon. A tetraploid brome, heretofore known from only one location, was collected along a 100-mile stretch of the Yukon River and is being described as a new species. Examination of the tetraploid B. richardsonii and diploid B. ciliatus substantiated their separation as species and verified the presence of B. richardsonii in Alaska.

Collections were made of fescues and bluegrasses in connection with the turfgrass program. Biosystematic studies were furthered on species of Agropyron and Calamagrostis. Chromosome counts of other taxa were obtained, to be reported in the literature.

Detection of hybridization in the Hordeae is attributed to frequent crossing between Agropyron sericeum and Hordeum jubatum. Studies were continued on the taxonomy and distribution of the Leguminosae in Alaska.

Phenology of grassland and woodland communities was initiated, with the findings to be related to climatic measurements. The vegetational ecology of undisturbed Calamagrostis canadensis range prior to its being stocked with beef cattle was also determined; this provides a base for future studies to determine secondary successional relationships resulting from grazing. A broader ecological study was initiated to describe grasslands of southcentral Alaska and to determine primary successional relationships; this is intended to further a better understanding of land usage, particularly for grazing purposes.

TURF Experiments were established relating date of seeding, variety, row spacing, and fertilizers to seed production. A sharp break in the volume of growth and number of tillers occurred between the June 15 and June 29 plantings in bluegrass, and between June 29 and July 13 in red fescue. Data on affect of planting date on meristem induction and initiation will be obtained in the spring of 1965.

A polycross nursery of 81 superior red fescue plants was established. A new source nursery of about 2,500 red fescue plants was established including material from Alaska, Scandinavia, and Canada.

Several Alaskan selections of bluegrass and red fescue continue to give performance superior to that of the best introduced varieties under turf management. Some 200 new selections were seeded in 5 x 5 foot plots at Palmer and College in comparison with standard varieties. Several indigenous selections equalled or surpassed the standards in rate of establishment, density, and color.

Several selections were increased and seed will be available for more extensive turf testing in 1965. Several new increase blocks were established.

Clipping at one inch in 1962 and 1963 had no deleterious effects on Kentucky bluegrass varieties but significantly improved winter survival and spring vigor in red fescue. Clipping at 1/2-inch in 1964 had no visible deleterious effects although its influence on winter survival cannot be evaluated until 1965. It is postulated that close clipping is much less injurious under very long photoperiods than under short photoperiods.

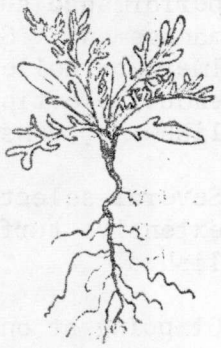
FLOWERING Disection of meristems of 10 grass species native to Alaska revealed that floral initiation occurs and development often preceeds to an advanced degree in the fall. Initiation in temperate zone grasses normally occurs in spring following induction the previous fall. Thus unique adaptation of far-northern grasses to insure flowering and seed maturation in short growing seasons has not been reported in the literature. It is a character that may prove valuable in breeding grass varieties capable of early maturity in the relatively short seasons of northern areas.

Temperate, sub-arctic and arctic ecotypes of Poa and Bromus were exposed in the field to shortened, normal and lengthened fall photoperiods in a floral induction study. Following varying exposures, plants were removed to the greenhouse and grown under 14- and 18-hour photoperiods. Arctic ecotypes headed in two weeks, indicating that initiation and development were occurring in the fall. Lengthened fall photoperiod resulted in most rapid and abundant heading. Flowering occurred under 14- and 18-hour photoperiods, but was somewhat restricted in the former. Temperate ecotypes headed little, indicating limited fall induction. Subarctic ecotypes were intermediate in response.

Cold treatments at 34° F for 2, 4, and 6 weeks following 48 hours of soaking failed to cause vernalization of seeds of various ecotypes of Poa pratensis, P. alpina, Festuca rubra, Bromus inermis, and B. pumpellianus.

cereals

Looking toward the day when farm organization and economic conditions might favor wide-scale grain production in the far north, some work continues on improving grain characteristics, on storage and on marketing.



Evaluation of data collected on variety field trials in previous years lead to a complete reclassification of all breeding lines, with many no longer of value being discarded. Some 75 newly selected lines each of barley, oats and wheat were incorporated into 1964's field trials, being compared with standard varieties. Additional advanced generation lines of hybrid origin were planted in head-rows, visual selections being made of promising rows and plants.

The current breeding effort is concentrated on barley, including continuing evaluation of a 16-line hybrid, development of the same 16-line hybrid following selection for yield components in each generation, and within hybrid crosses based on yield components exhibited by F_2 generations.

Hybrid barley populations were grown and evaluated for yield components. Portions of F_2 populations were also bulked and planted at a number of locations to discover the effects of further natural selection.

Differential shattering did not occur in the barley nursery during 1964. Consequently, evaluation of new lines for resistance was not possible. Shattering continues to be a major problem in some production areas. Analysis of previous shattering ratings revealed significant differences between barley lines, suggesting that improvement in this character is possible. There appears to be no correlation between shattering and lodging ratings, an indication that different factors are influencing varietal response to these characteristics.

New oat selections, under yield and agronomic evaluations, were examined for forage potential. Those found satisfactory for grain yield, maturity and lodging resistance will be tested for forage yield.

Possible use of a defoliant-desiccant on barley in Alaska was investigated again in 1964, starting treatments at an earlier stage of growth than previously. Yield data from this experiment are not yet available. Analysis of 1963 results indicates that materials of this type may prove valuable in lowering grain moisture content at harvest, with no reduction in yield or germinability of seed.

MUTAGENIC AGENTS

Four lines from Edda barley, 19 lines from 4 oat varieties and 5 lines from 3 wheat varieties, all selected from material treated with mutagenic agents, were planted in preliminary yield trials in 1964. Although both X-ray and thermal neutron treatments were employed, all but one of the above lines were selected from material receiving thermal neutron treatments. Reduction in population size due to greater damage by X-ray treatment offers a partial explanation for the lack of selections arising from this treatment. Selected lines are being compared with standard varieties and lines selected by conventional breeding methods.

Approximately 200, 150 and 75 lines of barley, wheat and oats, respectively, derived from ethylenimine treated material were grown in head-row plantings in 1964. Visually selected lines and plants were saved for more extensive testing. Selections from the 1963 ethylenimine treatment series of Edda barley were overlooked in preparing planting plans, so evaluation of this material was delayed.

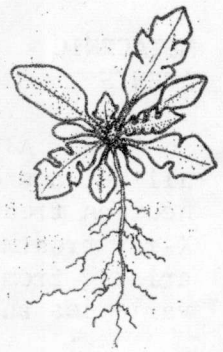
STORAGE

Because wet fall seasons sometimes preclude harvesting dry grain in most of Alaska, methods of storing wet grain are being sought. In 1964, 12 plastic-lined 1-ton plywood storage boxes were constructed. They were filled with wet grain (34 per cent moisture) directly from the combine. Thereafter the filled boxes were handled by a forklift, fitted with tape sealed plastic covers and stored outside. Evaluation will be obtained from feeding to lactating cows. A pilot study utilizing 1 gallon containers held six months at 35° F indicates that fermented barley can be held at any moisture content up to 42 per cent. Samples containing less than 22 per cent moisture germinated after storage.

Valley-wide sampling of local barley and oats moving through marketing channels continued in cooperation with the Alaska Division of Agriculture and a farm organization. Evaluated were 145 loads of barley and 34 loads of oats.

potatoes

Potatoes rank second to milk as a cash crop in Alaska. Still under study are improvements in frost tolerance, diseases, storage problems, and the possibility of exporting superior seed.



During a search for agents associated with light-induced inhibition of potato sprouting, a seed germination inhibitor has been extracted, the chemical nature of which is now being studied. Effect of hormones and growth regulators on delaying tuberization was explored in an effort to reduce hollow heart, second growth and cracking without reducing yield. Tuber producing efficiency of the plant was again influenced by storing seed with bud-end either up or down. Periods of greater total light encouraged vine growth, less tuber growth. No other environmental factor seemed as closely related.

At College, 24 varieties and strains of potatoes were evaluated through weekly harvests, an apparently effective method of selecting best adapted types. Alaska Russet's response to 6 nitrogen levels showed 60 pounds/acre inadequate for best yields. No significant differences were detected between 120 and 160, or 200 and 240 pounds/acre.

Foliar applications of 3 pounds and 6 pounds of maleic hydrazide (MH-30) per acre equally controlled sprouting, reduced weight loss and reduced after-cooking darkening of tubers held in common storage for one year when compared to untreated checks. Time of application and concentration of MH-30 had no affect on yield of U.S. Number 1 (2" minimum diameter) tubers of Alaska 114 and Kennebec varieties in 1962, 1963 and 1964.

VIRUS FREE SEED Virus X free potato seed can be grown in Alaska's Matanuska Valley with no more than the normal sanitary precautions observed in producing table stock. Virus-free Kennebecs harvested at Palmer were yield-tested in Arizona -- where they topped other accessions -- and in California. Tubers produced in Arisona remained free of virus X while those grown in California showed an 8 per cent level of reinfection.

Virus X free Kennebec stocks produced in Alaska carry a latent virus other than X that induces lesions on Gomphrena, a diagnostic plant. Although serological tests indicate the possible presence of virus S, it has not yet been definitely identified.

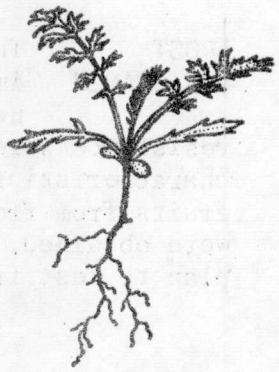
The Green Mountain potato variety, most popular in Alaska, seems heavily infested with virus X. Preliminary diagnostic trials with G. globosa reveal some tubers apparently low in virus X content, or tubers infected with a mild strain, and promise a way to select for improved yields. Paired samples indicate yield increases of 50 per cent may be attained.

FROST RESISTANCE

The dry matter content of a frost-resistant potato seedling was improved by crossing with a non-resistant line. Out of this new line 69 early tuberizing seedlings possessing some frost resistance were selected for further testing. All have specific gravity characteristics exceeding 1.085 with several exceeding 1.107. Although many fruits from frost resistant crosses proved parthenocarpic, some 5,000 seeds were obtained. Late flooding in the Kobuk and Yukon valleys nullified a plan to test frost resistant potato seedlings in those areas.

vegetables, fruits

Certain favorable sites in Alaska produce excellent cool-season vegetables. There is also a potential for growing certain warm season crops by judicious use of heat-trapping techniques and selected varieties.



Replicated trials -- aimed at screening better adapted materials from new varieties developed elsewhere in the United States -- were again undertaken at Palmer. Outstanding among the new vegetables were Sprite bean, Cylindra beet, Imperial 10-6 and New Snowball 630 cauliflower, and Royal Chantenay carrots. Michigan Ohio, Wiebull's Immuna and Fantastic hybrid tomatoes are best adapted for greenhouse culture at this latitude. At the College site 20 cabbage lines and 10 advanced selections, all developed there, were further evaluated. Advanced cabbage selections made in 1963 were grown for seed; stumps of selected heads were stored for seed production next year.

FREEZING PEAS One canning and six freezing type peas were evaluated at two Matanuska Valley sites (Matanuska Farm, Lazy Mountain). While average seasonal air temperatures were higher at the low altitude site, night temperatures were higher on the mountain slope. Planting dates ranged from May 18 through July 15, at 7-to-11-day intervals. Seven plantings of 15 additional varieties gave a total of 12 planting dates. At Matanuska early type peas matured for processing from plantings made through July 2. In late August and September mature pods remained on the vines for 7 to 10 days without appreciable change in quality and with little vine rot evidenced. Peas were not frost damaged until October 11, 25 days later than usual. On the mountain slope, plantings made June 22 and later did not mature.

Some early planted lots at Matanuska matured dry seed, with possible yields of 1 1/2 tons per acre. If these garden pea varieties might be substutited for Canadian peas in forage plantings there is a chance that seed might be locally grown.

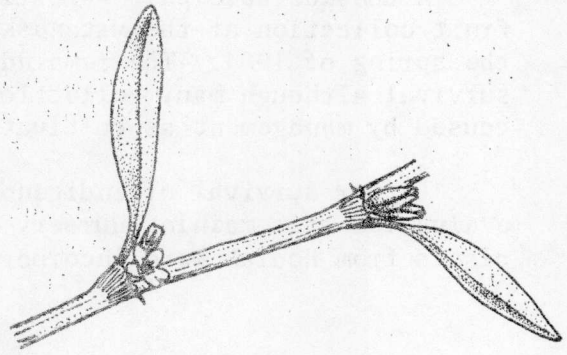
SMALL FRUITS During 1964, 21 varieties of strawberries were imported for observation while 800 seedlings were transplanted into the field for evaluation and selection. Selection of previously transplanted accessions was carried on as in the past. Twenty crosses having many vigorous, promising seedlings were selected for further evaluation and improvement. Temperature of strawberry crowns and roots averaged 1.6° F to 7.0° F lower during the winter months when plants were covered with 6 inches of snow as compared to plants covered with 16 inches of snow. Exposure to prolonged low temperatures resulted in a 90 per cent loss of mother plants, 86 per cent increase in weak runner plants and a 49 per cent decrease in total fruit production when compared to plants under 16 inches of snow cover. Snow cover depth had no affect on fruit size.

A considerable part -- estimated at 75 per cent -- of the indigenous fruit collection at the Matanuska Farm was inadvertently destroyed during the spring of 1964. The remainder of the nursery exhibited fair winter survival although many collections succumbed to winter damage apparently caused by management as cultivated plants.

Better survival of indigenous fruits were observed at College where evaluation of remaining nursery plantings will continue. A few strawberry plants from Kodiak were incorporated into the College nursery.

weed control

Great national concern is now expressed over pesticide residues. Weeds are Alaska's major farm pest, especially in vegetable production enterprises.



In feed production enterprises, weeds are incidentally controlled on fields in perennial forage by frequent harvesting. Weeds are more difficultly kept down on fields planted to annual forages which have customarily been harvested only once a year. Now a rapid increase in farm acreage devoted to oat-pea-ryegrass mixtures promises better biological control since this combination is cut twice during a single growing season. Twice-a-year cutting prevents the maturation of many weed plants (mustard and lambsquarter). Harvesting before they mature seed helps keep weed populations in check.

CHEMICALS In 1964 four relatively new herbicides were compared with DNBP for general weed control in barley. Ioxynil gave promising control of most weeds with no apparent damage to the barley seeding. Although Tordon also gave excellent control it induced severe damage at the rates applied. Further testing is needed before firm conclusion can be drawn. Previously noted stimulation of barley by high rates of DNBP were not confirmed in this year's trial. Stimulation therefore may be attributed to fertility gradient in the field.

Ioxynil promised control of hemp nettle in a farmer cooperative trial being somewhat more effective than MCPA. Tordon gave the most effective control but induced damage of both oats and barley.

Chemical weed control trials were conducted for potatoes, carrots, cabbage, beets, sweet corn and Limnanthes (a potential oil seed crop for Alaska). Preliminary screening of new herbicides was accomplished with an exponential sprayer (in two replications), 19 relatively new materials being evaluated. Advanced investigations involved potatoes, carrots, cabbage and Limnanthes.

Dacthal at 10 to 12 pounds per acre is still the best registered chemical for weed control in crucifers. Of 6 or 7 excellent herbicides for carrots, one is expected to be registered for 1965. Atrazine was effective in killing weeds under polyethylene mulched sweet corn. Other materials proving useful for specific purposes were Ametryne, Prometryne, Prometone, Paraquat, Diquat, Betasan, Rogue, and TOK E-25. Most of these have not yet been cleared by the Food and Drug Administration.

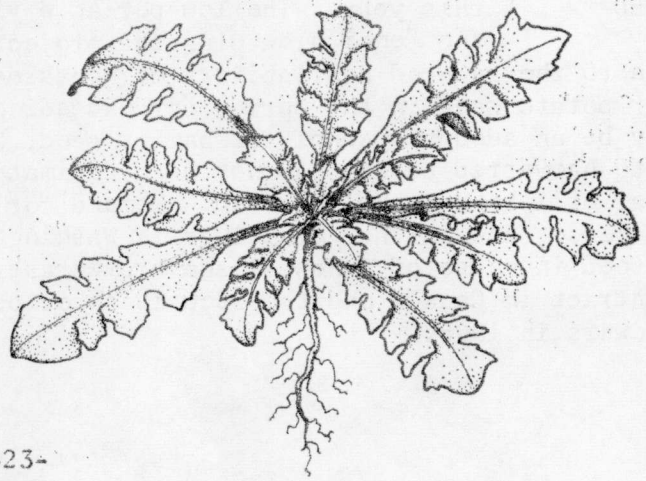
water

A major portion of Alaska's agricultural areas are characterized by inadequate precipitation during the early growing season. Water use and irrigation feasibility are subjects of major interest in most years.

Irrigation is essential to efficient truck crop production in south-central Alaska. In most years, supplemental water during May and June make the difference between an early saleable crop and no crop at all. Irrigation is usually essential in establishing small seeded forage crops since adequate surface moisture determines the effectiveness of chemical weed control measures and insures the competitive position of the seeded stand. While mature grass stands usually respond to supplemental water, the economy of irrigation is often questionable. In 3 out of 5 years potatoes respond profitably to supplemental water.

During 1964, reciprocating plot irrigators were improved and two additional units were constructed to insure greater precision in application, and greater ease in randomizing treatments. Preliminary data analysis indicates that supplemental water improved lettuce yields by 85 per cent, carrot yields by 77 per cent and celery by 66 per cent. Although little improvement was noted in bromegrass yields, timothy gave responses of up to 23 per cent. Timothy also gave greater responses than bromegrass when the forage was grazed by dairy animals.

An essential factor in designing an efficient irrigation system is adequate knowledge of an economical infiltration rate, a characteristic of the field surface. Studies of infiltration rates received continued support during 1964. Further improvement in instrumentation enhanced precision of measurement and improved efficient use of time.



plant diseases

Besides the virus X studies of potatoes, other plant diseases received attention. Emphasis is on both preventative and corrective measures. In addition, a basic study of Streptomyces scabies continued.

The time between inoculation and sporulation of potato scab (Streptomyces scabies) was found to be influenced by (1) the individual isolate, (2) inoculum concentration, (3) C:N ratio, (4) the amount of carbohydrate in the medium, (5) agar concentration, (6) thickness of the medium, and (7) temperature. Soil extracts greatly stimulated growth or spore germination beyond that induced in nutrient medium containing yeast extract, according to Warburg comparisons. Greatest stimulation was exhibited by forest soil, and appeared correlated with soil organic matter content.

Tested against 87 S. scabies isolates and 20 unidentified soil isolates of streptomyces were 20 single plaque isolates. All 20 phages produced the same type of plaque, quite different from Norwegian phage isolates. Variability in host range among the 20 showed none to be closely related.

Lettuce anthracnose was again quite common during the 1964 crop season. Except in a few cases, infected heads held in cold storage failed to show penetration of lesions into the inner leaves although they continued to enlarge. Sclerotinia sclerotiorum was found attacking 11 per cent of all plants in one lettuce field.

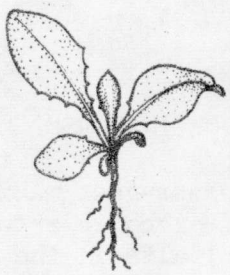
Studies of stored vegetable diseases was confined to data analysis and preparation of reports.

CERTIFIED SEED

Certified seed acreage of both potatoes and cereals was down this year. The low per acre yields of potatoes, especially in the Kenai area plus the projected demand for local tablestock due to the reduced availability of "outside" potatoes should create a demand for potato seed in the spring far exceeding the certified seed supply. There may be an adequate supply of barley seed, but the effect of early snows on late harvested barley has not been estimated. Most of the oat seed for next year will have to be imported. Demand for Engmo timothy seed continues to increase, and further plantings in Washington state have been contracted for. A seed increase of a new Alaska bromegrass variety is being grown under contract in Canada and the seed is expected to be available to Alaskan growers in 1966.

insects

Both beneficial and harmful insects are of concern. Household pests, crop and animal pests, and pollinators received attention in 1964.



The earthquake produced some drastic local habitat changes and a number of insect problems which have not been serious for several years became prominent. Cutworms (especially the red-backed cutworm) were widespread and the most destructive in a number of years to grain, flowers and vegetables. Silvertip of Poa was very numerous in experimental plantings. Among the prominant household insect problems were brown banded and german cockroaches, carpenter ants, clover mites, silver fish, and in stored products in homes such things as Mediterranean flour moth, confused flour beetle, and saw toothed grain beetle. Several forest insects such as yellow tailed, horn tail wasp and others emerged into houses from freshly used lumber.

For the first time, larvae of the fireweed horn worms were found by the hundreds in Matanuska Valley. Mosquitoes continued an annoying problem beyond the spring months in south central Alaska for the second year in a row.

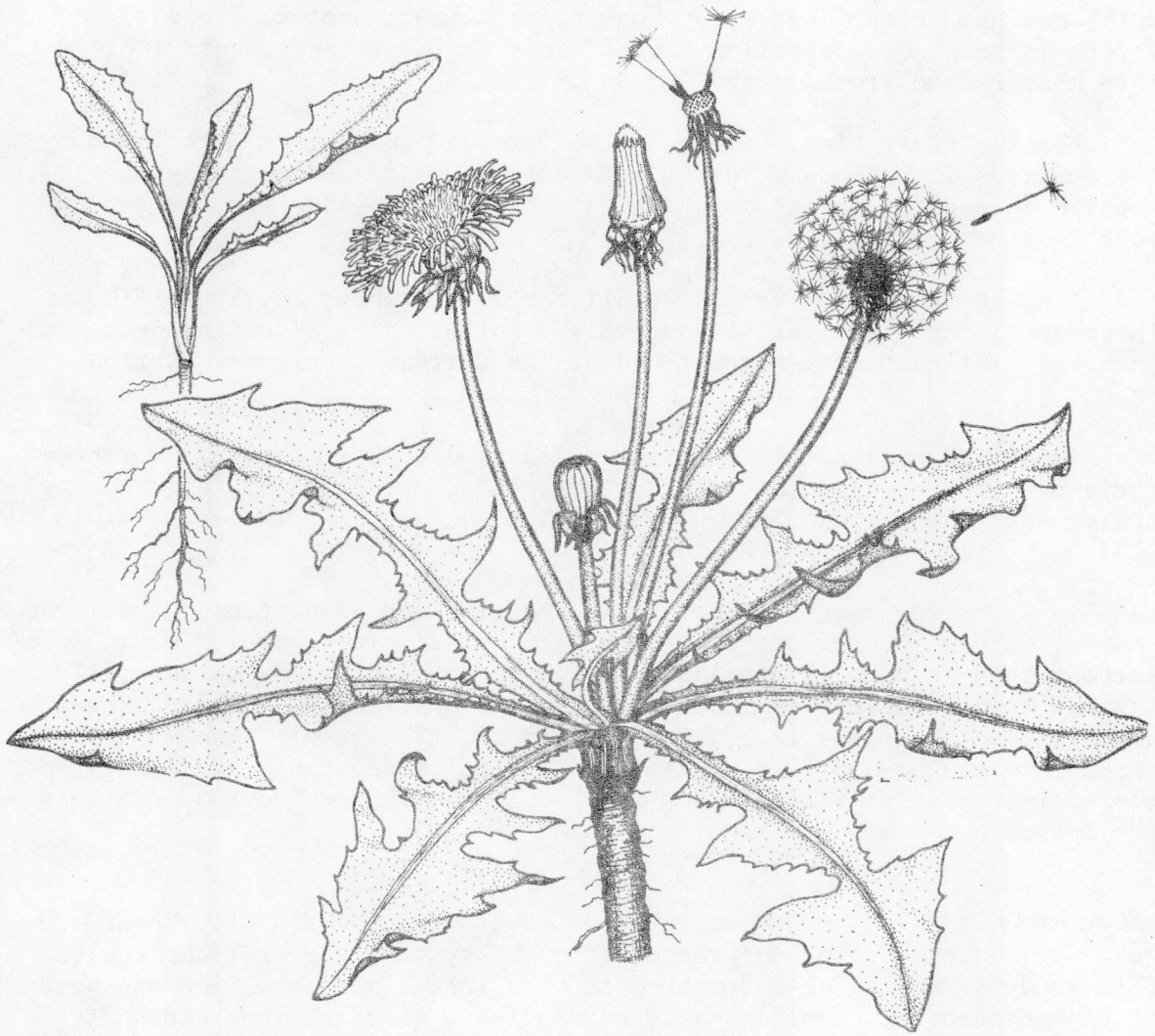
A new potentially serious defoliator of strawberries, identified as Faleuracella nymphae, was widespreadly defoliating strawberries near the Anchorage international airport and at the College Experiment Station Farm.

Among the ornamental infesting insects which were serious, were the cyclemen mites on african violets, two spotted spider mites, bird cherry aphid, wooly aphids on alder and spruce.

MAGGOTS Turnip maggots were late in emerging and populations were lighter than in previous years so that control practices reflected more success than is usually attained. A neoplectanid nematode successfully invaded turnip maggots in the laboratory; if application techniques can be devised, this parasite offers some promise of control. A new ether-based chemical also offers control possibilities for home gardeners. Four commercial granular insecticides applied in the furrow provided controls of varying effectiveness.

WARBLES A total of 100 male reindeer fawns were treated with "pour-on" and injections of three different systemic control chemicals. This study is now being undertaken in cooperation with the Goodhope herd at Cape Espenberg, a well managed enterprise free of caribou and wolf problems. Animals treated in 1962 at Selawick were not rounded-up in 1963. Six hides, however, were recovered in 1964 from treated animals and will be available for examination after tanning.

POLLINATORS Observations and collections of native pollinators were continued. There appeared to be a surge in population of the paper-nest making vespoid wasps. Both honey bees and a leaf cutter bee (Megachile rotundata) were utilized in pollinating a synthetic strain of alfalfa in the greenhouse. Due to availability of heat, plants were beginning to bloom at time of introduction and the blossoms tripped readily. Seed production on an acre basis amounted to 338 pounds from one cropping, which is much more successful than in previous years, when sun was the only source of heat. A synthetic sweet clover at Matanuska station produced 1,600 pounds (on an acre basis) from a small plot adjacent to the hives. Honey bees appear to be the predominant species in pollinating Limnanthes douglasi, a potential oil seed plant. As in the past, insect pollination was beneficial in producing set of fruit in Malus, Prunus and Rubus.



economics

Included here are reports covering a range of interests. Marketing, statistics, and farm management were emphasized during 1964.

RED MEAT A survey of 500 randomly selected Anchorage households was conducted during August, designed to obtain the necessary information for ascertaining the potential and projected demand for red meats in the railbelt area. In general, it substantiates previous observations and surveys concerning level of education, age, size, composition and mobility of families in Anchorage. Particular emphasis was placed on demand determinants such as income levels, meat and meat substitutes, consumption patterns, buying practices, and other background information.

From the 500 households surveyed 60 were selected at random to participate in a home panel survey. Members of the panel were given household scales and record sheets to be used and filled out before each meal for two weeks. Some preliminary figures from the panel indicate that Anchorage households consume on the average more red meat than in the other 49 states. The "extra" red meat consumed is by and large wild game.

DAIRY PRODUCTS Analysis of data obtained from the consumer milk study conducted at Fairbanks continued; a manuscript is in preparation and will be ready for publication in June, 1965. Regression analyses revealed the effect of certain family characteristics such as income, age, education, years in Alaska, etc. on consumption of dairy products. Significant regression coefficients were found when relating consumption of butter to family income (0.75), and consumption of powdered non-fat milk to number of years lived in Alaska (0.63). A negative relationship was found when the total amount of dairy products in whole milk equivalents (butterfat basis) was related to the wife's education (-0.93), indicating families with higher educated wives tend to consume more non-fat, lower cost dairy products.

Some project time was spent in an attempt to find a solution to the dairy marketing crisis which developed as a result of increased competition from bulk shipments of milk to Alaska from the Washington-Oregon area. Assistance was given to the State Division of Agriculture in a 60-day survey of milk production and dairy products marketing. From July, 1957 to April, 1963, outside shipments of fresh dairy products to Alaska from Washington and Oregon rose about 140 per cent. Of the individual products, shipments of concentrated milk increased the most -- almost 510 per cent. Homogenized milk increased 84 per cent. The big change was in shipments of bulk milk. Information provided by this project will aid the dairy industry in evaluating the demand for dairy products and thus in developing and expanding the Alaskan market.

STATISTICS Farm costs in 1964 continued to follow the national upward trend. Fertilizer prices were slightly lower while farm labor and machinery costs remained close to 1963 levels or slightly higher. Property taxes, for those farms coming under the new borough taxing system for the first time, became a major farm cost. Alaska's dairy farmers faced a critical reappraisal of their businesses in 1964. Increased competition from milk produced outside of Alaska depressed prices and lowered moral within the industry. Although several dairy farmers discontinued operations, total milk production will be only slightly down for the year. Project leaders cooperated with the State Statistician in planning and conducting farm production surveys, seasonal reports and other statistical summaries. The historical series of prices maintained for commodities such as farm supplies, foods, etc. was continued. At the request of the federal Office of Emergency Planning a series of special semi-monthly surveys were conducted during July, August, and September in Seward, Valdez, Kodiak, Anchorage and Fairbanks to appraise the supply and demand situation and detect price changes or trends following the March 27 earthquake. Major emphasis was given to food prices. This project is providing information useful to agencies and individuals in appraising the agricultural situation and planning more orderly marketing.

MARKETS Work of an exploratory nature relative to new markets for other agricultural products produced in Alaska was continued. Project leaders are cooperating with those interested in establishing cold storage facilities for Alaska produced vegetables and meat. Development of a quick-freeze plant as an appendage to an already existing cold storage operation would appear most feasible. Frozen potato products and TV dinners utilizing locally produced vegetables and meat may offer the best opportunity in initial stages of market development.

Marketing information was made available to ARA-RAD officials and numerous meetings were held with these officials and industry groups both dairy and vegetable.

An economic analysis of hog production and marketing in Alaska was conducted. Costs of producing hogs in Alaska are higher. Slaughtering facilities are only now developing and marketing channels for local pork are relatively undeveloped. Price competition from shipped-in pork, both fresh and frozen will provide a deterrent to any major development of a pork industry in Alaska.

Information provided by this project -- especially economic feasibility studies -- are necessary and needed by ARA-RAD officials, Extension Service and individuals concerned with establishing new storage, processing and marketing facilities.

fur production

Fish waste, bottom fish, sea lion and fur seal carcasses are potential sources of protein feed for ranch fur production. Research studies are focused on special feeding problems that might be encountered in utilizing these vast resources, now barely touched.

MINK Eight equal lots of 16 female mink were utilized in a comparison of salmon waste, antioxidants, and seal meat. Three received pink salmon heads and three chum salmon heads. Alpha-tocopherol and the antioxidant BHT were compared in each three lots. Two additional rations contained fur seal meat, a recently available product never fed during the reproductive period heretofore. A comparison of such diets to those containing all fish was believed desirable.

Production results varied considerably with one control ration (pink salmon heads), one BHT ration (chum heads), and one seal meat ration having excellent production and the other five falling below that normally expected, indicating possible influence from factors other than the additives being tested. The two diets containing NHT averaged slightly better production than those receiving the alpha-tocopherol or seal meat.

A higher incidence of steatitis among the young was experienced on the rations containing pink salmon heads than those containing chum salmon heads. The antioxidant and Vitamin E adequately protected the animals from steatitis. The pink salmon head ration supplemented with BHT maintained the best general health, produced the best quality fur, and had the highest pelt value.

Iron compounds have proved effective in controlling "cotton" pelt in mink.

FOX Production and fur quality in the small fox herd has increased materially since the antioxidant BHT was added to their diets although a predetermined breeding plan designed to improve and possibly fix attractive color variations between white and blue foxes has been impossible to follow because of the small number of animals kept for breeding purposes and the reluctance of some males to breed certain females.

Twelve female foxes were kept over for breeding purposes in 1964 -- five proved breeder adults and seven pups. Examination of females for approaching estrus was started March 10. The first mating took place

March 14 and the last on May 5. Four young females kept for breeding purposes from the same litter did not breed until the latter part of April and first week of May. The latter litter was not born until June 26. Eight females that bred on two or more successive days and two which only mated once whelped a total of 48 pups. The remaining two were only bred once and did not produce. This was the best fox production experienced in several years.

MARTEN Attempts to raise marten in captivity have met with decreasing success the last three years although the animals have maintained good health. Each year five to 12 females have bred from one to four or five times during July and August, yet only three litters were born in 1961, two in 1962 and none in 1963. Occasional checks after observed matings have disclosed live, viable sperm so it is presumed that fertilization and/or implantation does not take place due to some nutritional deficiency or improper management practice.

Additional help permitted more attention and closer observation of the marten during the 1963 breeding season. Fourteen females mated a total of 57 times. Fifty-one of these observed matings took place in July and six in August. Seven females were bred by two or more different males. This was by far the most active marten breeding season in several years, yet for the second consecutive year and the third time in the history of this station, no young were born in 1964.

University of Alaska
ALASKA AGRICULTURAL EXPERIMENT STATION

January 30, 1965
Palmer, Alaska

Replaces list of October 14, 1964

Experiment Station Projects

		Approximate termination date
20	Improvement of milk production through crossbreeding	Feb 66 D
34m	Markets for Alaska's agricultural products	Jun 65 O
41	Forage crop production	Jan 66 A
43	Mutagenic agents in forage crop improvement	May 65 A
50	A superior strain of blue fox	con F
51	Marten mating systems (for) . . . regulatory and prolificacy	con F
52	Diets for fox, mink, and marten	con F
53	Influence of potassium fertilizers on Alaskan crops	Jun 64 S
74r	Indigenous rubus, ribes, vaccinium and fragaria	Feb 66 H
75	Emergency insect control measures	con B
81	Improving dairy production by crossbreeding	Feb 69 D
82m	Pathogenic decomposition of stored vegetables	Mar 64 P
97	Cereal production in Alaska	Jul 64 A
101	Frozen semen for Alaska's dairy industry	May 65 D
103	Climate related to plant response in the Matanuska Valley	May 65 E
107r	Some factors influencing . . . grasshoppers	Jun 65 B
112r	Water infiltration rates	Mar 65 S
114	New cereals for Alaska	Feb 66 A
115	New forages for Alaska	Feb 66 A
116	Alaska's potato virus dispersion rate	Mar 66 P
117	Response of potatoes to a subarctic environment	Mar 65 H
118	Herbicides for Alaska's horticultural crops	Mar 67 H
119	Life cycle of H. florialis . . . and improved controls	Mar 67 B
120	Frost resistance foliage for Alaska's potatoes	Mar 66 H
121	Indigenous forage plants of Alaska (Rockefeller)	Mar 64 A
122r	Loose housing for Tanana Valley dairies	Jun 64 E
123	Response of vegetables to Alaska's subarctic environments	May 65 H
125	Heat loss through various walls	May 64 E
126m	Maintaining and expanding markets for dairy products	Oct 68 O
127	Nature of winter survival in Alaska's fragaria	May 65 H
128	Systemic treaments to control reindeer warbles	May 65 B
129	Alaska's turf grasses, breeding physiology, seed production	May 67 A
130	Improving the efficiency of Alaska's insect pollinators	May 65 B
132	An improved dairy calf ration for Alaska	Oct 65 D
133r	Temperature studies of agricultural areas . . . in Alaska	Oct 67 E
134m	The economics of marketing Alaska's red meats	Oct 67 O

136	Soil productivity and fertilizer practices	May 68	S
137m	Analysis and interpretation of . . . statistics	May 66	O
138	Potato scab, its circumpolar distribution and variability	Jun 66	P
139	Value of Alaska's forages ensiled at various stages	Jul 68	D
140	Weed control in Alaska's cereals and forages	Jul 68	A
141m	Utilization and storage of Alaska's grains	Jul 67	E
142	Agricultural engineering problems in Alaska	Jul 67	E
143	Crop improvement in Alaska	con	P
144m	Prolonging the marketing period of stored Alaskan potatoes	Sep 66	H
145	Date of harvest as a factor in marketing canning peas	Sep 66	H
146	Minimum tillage	Aug 67	E
147r	Collection of indigenous grasses for use as forage or turf	Aug 68	A
150	Measurement of light quality of the natural spectrum (NIH)	Sep 66	H
151	Permafrost recession related to cropping practices in Alaska	Jun 67	H
152	Utilization of fermented barley in dairy rations	Jan 68	D
153	Physiology of flowering grasses important to Alaska	Jun 67	A
154	Defining the competitive posture of Alaska's farmers	Oct 67	O
155	Response of crops to supplemental water	Oct 69	E
156	Annual & perennial pastures	Oct 68	D
157	Production of beef from dairy animals	Nov 67	D
158m	Pesticide sales and consumption in Alaska	Dec 68	O
159	Establishment of superior forage . . . Kenai Peninsula	Jan 70	E
160	Potato skin spot in Alaska	pend	P
161	Blow fly control in fish	Feb 69	B
162	Biochemistry of forage utilization	pend	D
163	Farm handling of high moisture barley in air tight containers	pend	E

:::Subject matter code (last column) shows assignment of major responsibility:::::

Agronomy	A	Agricultural engineering . .	E	Fur production . .	F
Entomology . . .	B	Agricultural economics . . .	O	Horticulture . . .	H
Dairy husbandry	D	Plant pathology	P	Soil science . . .	S

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